

YUKON RIVER SALMON ESCAPEMENT SURVEYS, 1991

By

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INTRODUCTION

Annual documentation of spawning escapements is an essential element to responsible management of the Yukon River salmon resource. Such documentation provides for:

- determination of appropriate escapement levels or goals for selected spawning areas or management units.
- evaluation of escapement trends.
- evaluation of effectiveness of the management program, which in turn forms the basis for proposing regulatory changes and management strategies.
- evaluation of stock status for use in projecting subsequent returns.

The Yukon River drainage is too extensive (330,000 mi²) for complete comprehensive escapement coverage to all salmon spawning streams during any given season (Figure 1). Consequently, low-level aerial surveys from single-engine, fixed-wing aircraft form an integral component of the escapement enumeration program. Nevertheless, comprehensive enumeration studies such as intensified ground surveys, mark-and-recovery experiments, counting towers, weirs, and hydroacoustic projects are also conducted. Regardless of the method utilized, the overall objective of escapement enumeration in the Yukon Management Area is to determine abundance (or often indices of relative abundance), timing, and distribution of spawning salmon populations throughout the drainage. Specific objectives may vary by individual project.

There are both advantages and disadvantages related to each type of enumeration method. The more comprehensive studies tend to provide estimates of total salmon abundance and are often less dependent upon weather and water conditions. However, due to costs associated with manning and operating the more sophisticated enumeration projects, relatively few have been initiated over the years and have been restricted primarily to major spawning streams, e.g., the Anvik, Andreafsky, Sheenjek, Chandalar, Chena, Salcha, and Delta Rivers in Alaska and the Fishing Branch River and Whitehorse fishway in Canada. Only during the past decade (since 1985) has an attempt been made to estimate total salmon passage by species through the lower mainstem Yukon River. This project, located at rivermile 123 near Pilot Station, involves using hydroacoustic techniques to estimate the total number of fish passing upstream as well as a comprehensive test drift gillnet fishery to apportion sonar counts to species. A second study designed to estimate salmon abundance by species in the mainstem Yukon River has operated annually since 1982 (excluding 1984) near Dawson in Canada. That project involves a comprehensive mark-and-recovery study designed to estimate the abundance of chinook and chum salmon entering the Canadian portion of the mainstem river.

Perhaps the greatest advantage of aerial surveys, as they pertain to the Yukon River drainage, is the cost-effectiveness of obtaining escapement information throughout an extremely vast area, most of which is remote. Another advantage to aerial surveillance is that real or potential habitat-related problems arising

from natural or man-induced causes can be readily identified. Among the disadvantages are that results may be highly variable if non-standardized procedures are used.

Variability in aerial survey accuracy is dependent upon a number of factors such as weather and water conditions (turbidity), timing of surveys with respect to peak spawning, aircraft type, survey altitude, experience of both pilot and observer, and species of salmon being enumerated. It is generally recognized that aerial estimates are lower than actual stream abundance due to these factors. Further, peak spawning abundance measured by aerial survey methods is significantly lower than total season abundance due to the die-off of early spawners and arrival of late fish. Also, aerial estimates in a given stream may demonstrate a wide range in the proportion of fish being enumerated from year to year. Peak aerial counts, however, can serve either as indices of relative abundance for examination of annual trends in escapement or estimation of total escapement from base year data and established expansion factors. Aerial survey results may also be useful in apportioning tributary spawning distribution to a mainstem total escapement estimate obtained from sonar, weir or tower counts.

Aerial escapement estimates are made of as many spawning streams as possible within the confines of fiscal, manpower, and weather constraints. However, selected (representative) spawning streams or "index areas" have been identified and receive highest priority. Index areas have been designated due to their importance as spawning areas and/or by their geographic location with respect to other unsurveyable salmon spawning streams in the general area.

Interim escapement objectives have been established for several Yukon River salmon spawning systems (Table 1). These objectives represent the approximate minimum number of desired spawners considered necessary to maintain the reproductive potential of each stock and are based upon historical performance, i.e., they are predicated upon some measure of historic averages. Establishment of "optimum" escapement goals is not possible at this time due to the nature of the Yukon River mixed stock fisheries, lack of stock identification data, and consequential inability to reconstruct total in-river stock specific returns. Consequently, most interim escapement objectives are based upon aerial survey index estimates which do not represent total escapement but do reflect annual spawner abundance when using standard survey methods under acceptable survey conditions. This is particularly true for those objectives established for chinook and summer chum salmon with the exception of the Anvik River. The summer chum salmon interim objective for the Anvik River is for total population of spawners. Interim objectives which have been established for selected fall chum salmon spawning stocks, all represent the desired minimum target for total spawning abundance; being based upon a somewhat more comprehensive escapement data base.

METHODS

Among the comprehensive escapement enumeration studies conducted in 1991 to more completely estimate total abundance of spawners, hydroacoustic techniques were employed to monitor chum salmon escapements to the Anvik and Sheenjek Rivers, while replicate ground surveys and stream life data were used to estimate abundance of chum spawners in the Delta River. Additionally, mark-and-recovery studies were conducted by the Sport Fish Division to generate population estimates for chinook salmon spawners in the Chena and Salcha Rivers.

In addition to these site specific studies, the department also monitored salmon abundance by species in the mainstem Yukon River near Pilot Station by hydroacoustic methods for the sixth consecutive year.

Projects conducted by the Canadian Department of Fisheries and Oceans (DFO) consisted of a mark-and-recovery project near Dawson to estimate the total number of mainstem Yukon River chinook and chum salmon passing the US/Canadian border into Yukon Territory. Site specific studies included manning an enumeration window and passage gate at Whitehorse to monitor chinook salmon escapement upstream of Whitehorse and operation of a counting fence (weir) on the Fishing Branch River (Porcupine River drainage) to enumerate chum salmon escapement.

Remaining escapement information throughout the Yukon River drainage in 1991 was obtained primarily by aerial surveillance and occasional ground surveys.

RESULTS

In general, survey conditions were fair to good in 1991 throughout most of the Alaskan portion of the drainage during the chinook and summer chum salmon survey season from mid July through August, allowing for most major index areas to be successfully surveyed. However, smoke from numerous wildfires did hinder surveys in the lower portion of the drainage (downstream of Kaltag). Due to budget constraints, 1991 marked the first year since statehood the department did not conduct aerial escapement surveys for chinook salmon in the Canadian portion of the drainage. Escapement estimates for that portion of the drainage are confined to limited observations made by DFO.

Few difficulties with inclement weather or availability of survey aircraft were encountered in surveying most fall chum and coho salmon index areas. Further, a limited number of reconnaissance surveys were made in portions of the Tanana and Koyukuk River drainages to locate other fall chum or coho salmon spawning areas.

Escapement estimates obtained in 1991 are shown in Table 2 while Figures 2 through 6 show selected major Yukon River tributary systems.

Chinook Salmon

Tables 3 and 4 present historic chinook salmon escapement data for selected streams during the period 1961-1991. Interim chinook salmon escapement goals established by the Department for eight Alaskan streams, or index areas, are: East (1,600) and West Fork (1,000) Andreafsky, Anvik (500), North (500) and South Fork (500) Nulato, Gisasa (650), Chena (1,700), and Salcha (2,500) Rivers (see Table 1)¹. These escapement goals are based upon aerial survey index counts which do not represent total escapement.

Overall, chinook salmon spawning escapements throughout the entire Yukon River drainage were assessed as good; in most cases meeting established escapement objectives.

The estimated sonar passage of chinook salmon at Pilot Station was only 76,000 between June 5 and July 18, the lowest passage estimate since project inception in 1986. However, two factors contributed to the low estimate: 1) salmon migration beyond the insonified zone, and 2) sonar beam attenuation. Based upon subsequent escapement monitoring, escapements appeared to vary throughout the drainage, with the best escapements occurring in the lower and middle portion of the river (i.e., Alaskan portion of drainage).

Aerial surveys in the lower river documented 1,938 chinook salmon in the East Fork and 2,544 in the West Fork Andreafsky River, and 625 in the Anvik River index area. Thus, escapement objectives were met in all of these rivers. Aerial survey results of the North (767) and South Fork (1,253) Nulato Rivers, and the Gisasa River (1,690) also revealed escapement objectives were met in each of these streams. Escapements in the upper portion of the Koyukuk River drainage were also judged good as evidenced by the 455 observed in Henshaw Creek, 60 in the Middle Fork Koyukuk River, and 630 in the South Fork Koyukuk and Jim Rivers. Additionally, 179 chinook salmon were observed in a poor survey of the Rodo River while 65 were counted in an incomplete survey of the Kateel River. A fair survey of the Tozitna River resulted in a chinook salmon count of 119 fish.

It is noteworthy that at least 80 chinook salmon were observed in the upper portion of Beaver Creek (Yukon River tributary upstream of Stevens Village) on a boat survey by Bureau of Land Management (BLM) personnel during the latter part of July. Observations on spawning location resulted in nominating approximately an additional 28-30 river miles of the upper portion of this stream for inclusion

¹ Interim chinook salmon escapement objectives were established by the department in 1983 for eight major spawning streams in the Alaskan portion of the drainage. Although originally established in the form of a range, for five of the eight streams, those ranges were subsequently changed to single point objective (see April 1987 and November 1988 JTC reports). The Salcha River objective was further revised prior to the 1990 fishing season (from 3,500 to 2,500 spawners). Although no escapement objectives have been established for individual Canadian streams, an interim escapement objective of 33,000-43,000 chinook salmon spawners for the mainstem upper Yukon River drainage (Yukon Territory) was established by the JTC in March 1987.

into the State's *Catalog of Waters Important for Spawning, Rearing, and Migration of Anadromous Fish*.

Inseason assessment of chinook salmon escapement to the Tanana River drainage in 1991 was made difficult by high and turbid water conditions which prevailed during the latter part of July and early August in the Chena and Salcha Rivers. Seven surveys were attempted of the Chena River while 6 were attempted of the Salcha River between July 15 and August 3. The highest aerial count was obtained on July 20 in each of these streams, but it is not known with certainty if the interim objectives were in fact achieved in either of these important streams. Both surveys were given an overall rating of "poor" due to survey conditions as well as being flown prior to peak of spawning.

The July 20 Chena River aerial count was 1,277 chinook salmon between Moose Creek dam and the confluence of Munson Creek on the Middle Fork River; 423 fish below the escapement objective. The total population of spawners was subsequently estimated as 3,025 fish from the Sport Fish Division mark-and-recapture experiment. Similarly, the Salcha River aerial count on July 20 was only 1,925 fish between the Transalaska Pipeline crossing and confluence of Caribou Creek, being 575 fish below the objective level of 2,500. The mark-and-recapture population estimate made by Sport Fish Division totaled approximately 5,600 fish.

Although considered "secondary" index streams in the Tanana River drainage, a survey of the Goodpaster River in 1991 documented 868 chinook salmon present, the highest on record for that stream, while 104 were counted on a poor survey of the Chatanika River.

Chinook salmon escapement in the Canadian portion of the Yukon River drainage was below average. The preliminary DFO mark-and-recovery population estimate of chinook salmon passing Dawson was approximately 41,000. Subtracting the preliminary estimated Canadian commercial and non-commercial harvest (18,400 excluding Old Crow) results in a total spawning escapement estimate to Yukon Territory (excluding the Porcupine River drainage) of approximately 22,600 chinook salmon; falling below the interim spawning escapement objective range of 33,000-43,000 fish.

Aerial surveillance of Yukon Territory spawning streams was very limited in 1991. DFO was successful in surveying only the Big Salmon, Little Salmon, and Wolf River index areas. Observations included 1,040 chinook salmon in the Big Salmon River between Souch Creek and Big Salmon Lake, 201 in Wolf River between Wolf Lake and Fish Lake outlet stream, and 326 in the Little Salmon River. Attempts at surveying the Nisutlin River were aborted due to high and turbid water conditions. Finally, 250 chinook salmon were documented in the Ross River (non-index stream) downstream of Lewis Lake outlet stream.

The number of chinook salmon which returned to the Whitehorse fishway in 1991 totaled 1,266. However, at least 40% of the fish which returned were estimated as having been from previous hatchery releases. From the total chinook salmon returning to the fishway in 1991, only 1,071 were passed upstream; the remainder being taken for hatchery brood stock.

Summer Chum Salmon

Table 5 presents historic summer chum salmon escapement data for selected streams during the period 1973-1991. Interim escapement goals for six major summer chum spawning streams in the lower Yukon River drainage are: East (109,000) and West Fork (116,000) Andreafsky, Anvik (487,000), North Fork Nulato (53,000), and in the Hogatza (Clear Creek at 8,000 and Caribou Creek at 9,000) Rivers. An additional escapement objective of 3,500 summer chum salmon exists for the Salcha River in the Tanana River drainage. As pointed out, with exception of the Anvik River objective which is for total abundance of spawners, all other objectives are based upon aerial survey observations during periods of peak spawning. The corresponding objective for the Anvik using this latter technique is 356,000 chum salmon between Goblet Creek and McDonald Creek.

The Yukon River sonar project at Pilot Station estimated a passage of approximately 1,233,000 summer chum salmon from June 5 through July 18. Although this number was greater than the extremely poor returns experienced in 1987 and 1989 (sonar passage 687,000 and 936,000, respectively), it was below the sonar passage in years of large returns; those exceeding 1.6 million fish (1985, 1986, 1988, and 1989).

Escapement objectives were met in only one summer chum salmon stream throughout the entire Yukon River drainage in 1991. This was in the Anvik River with a sonar-estimated escapement in excess of 860,000 fish. Summer chum escapement to all remaining index streams was poor and below objective levels, based upon aerial surveys. Fish counts in both the East Fork (31,900) and West Fork (46,700) Andreafsky Rivers were approximately 77% and 60% below their respective escapement objective. Similarly, the 12,500 summer chum salmon estimated in the North Fork Nulato River represented only 76% of its escapement objective. Only an additional 13,200 were estimated in the South Fork Nulato River on the same survey (no objective has yet been set for this river). Although still well below desired levels, summer chum salmon escapements in the upper Koyukuk River drainage appeared slightly better. For example, escapement to the Hogatza River (9,900) was 42% below the objective level. Approximately 14,400 summer chum salmon were documented on a good survey of the Dakli River while 2,100 were counted on a good survey of Henshaw Creek.

Few numbers of chum salmon were observed spawning in Melozitna Hot Springs Creek (1,720) or the Tozitna River (93).

In 1991, three summer chum salmon spawning streams in the middle Yukon River drainage were targeted as potential index areas for ground surveys, in an attempt to begin a ground survey data base which could be compared during years when aerial surveys are not possible. Index areas were identified and ground surveys conducted in portions of Grayling and Blackburn Creeks, located between the villages of Grayling and Kaltag, and in the upper portion of Caribou Creek (Hogatza River drainage). The number of summer chum salmon counted in these index areas were 1,937, 2,165, and 796, respectively.

A 4-H educational program provided funding and supervision of students for a counting tower in the Kaltag River in 1991. A tower count (unexpanded) of 5,130

summer chum salmon (and 21 chinook salmon) was made during the period July 11 through August 8. The count does not include the early portion of the summer chum salmon run due to startup difficulties.

No successful summer chum salmon surveys were completed on the Salcha or Chena Rivers in 1991 due to high and turbid water conditions during the period of peak summer chum spawning.

Fall Chum Salmon

Table 6 presents historic fall chum salmon escapement data for selected streams since the early 1970's. Total Yukon River fall chum salmon escapements are primarily evaluated based upon escapement observations to four major spawning streams: Delta, Toklat, Sheenjek, and Fishing Branch Rivers. Interim escapement objectives for these four streams in 1991 were >11,000, >33,000, >64,000, and 50,000-120,000 fall chum salmon, respectively.² These interim objectives are of total abundance which were based upon expansion of inseason point estimates. Using the low number (50,000) in the objective range for the Fishing Branch River, the total 4-area index escapement objective is considered as >158,000 fall chum salmon.

The overall projected return of fall chum salmon to the Yukon River in 1991 was 855,000 fish; lying above the 1974-1990 estimated average return of approximately 801,000. Based upon an analysis of brood year escapements, distribution and strength of various spawning stocks returning throughout the drainage were anticipated to be good, with exception of the Toklat River component which was anticipated to likely be poor. Nevertheless, it was hoped that the Toklat River escapement objective would be achieved in 1991, given action taken in 1989 by the Alaska Board of Fisheries (BOF) in closing the Toklat River and lower Kantishna River to subsistence fishing as well as reducing commercial fishing time in Subdistrict 6A. Those BOF actions were taken in an attempt to address a conservation concern over Toklat River fall chum salmon.

Comparative lower Yukon River test fishing data indicated an above average fall chum salmon return in 1991. Although a sonar estimate of only 240,740 \pm 14,646 fall chum salmon passing Pilot Station was made for the period July 18 to September 1, an additional 356,182 \pm 62,740 fall chum salmon were estimated to have passed beyond the range of the shore-based sonar, subsequent to July 20.

² Interim fall chum salmon escapement objectives for the Delta, Toklat, and Sheenjek Rivers were reviewed in November 1990 in preparation for the US/Canada JTC meeting and resulting changes reflected above include an increase of 2,000 fish in the Sheenjek River objective. The JTC recommended that the mainstem Canadian Yukon River interim objective be set at >80,000 fall chum salmon spawners (border passage less harvest). That recommendation was a change from the former objective range of 90,000-135,000 fall chums. The interim objective for the Fishing Branch River (Canadian stream), established by the JTC in March 1987, was not examined and remained unchanged (50,000-120,000).

Thus, the total number of fall chum salmon estimated passing Pilot Station in 1991 was approximately 597,000.

On August 17, in response to decisions issued by the Alaska Superior Court which granted injunctive relief to four subsistence fishing families on the Kantishna River, the department reduced commercial fishing time in all Yukon and Tanana River fishing districts below the Kantishna River for the remainder of the season. Reductions in fishing time were intended to provide protection for upstream migrating Toklat River fall chum salmon. This management action also resulted in reduced exploitation on other fall chum and coho salmon stocks. In brief, although the 4-area escapement index in 1991 totaled approximately 174,100 fall chum salmon, being approximately 10% above the combined 4-area escapement objective of >158,000, escapement objectives were only achieved in 2 of the 4 index areas; Sheenjek and Delta Rivers. Escapement objectives were not achieved in the Fishing Branch or Toklat Rivers.

Fall chum salmon escapement to the Porcupine River system was evaluated by observations made in the Sheenjek and Fishing Branch Rivers. The preliminary sonar-estimated escapement to the Sheenjek River in 1991 was approximately 90,000 chum salmon for the period August 9 through September 24. Although the interim escapement objective of >64,000 has primarily been predicated upon sonar observations made in selected years subsequent to approximately August 22, estimated passage in 1991 includes the early part of August. However, only 8,000 fall chum salmon were estimated to have passed the sonar site prior to August 22, indicating the escapement objective was achieved. Further, fish were still being passed at a rate of nearly 2,000 per day upon project termination. By comparison, the minimum Fishing Branch River interim objective of 50,000 fish was not reached. Only 37,733 fall chum salmon were passed through the weir during the period September 1 through October 15.

Escapement to the Toklat River in 1991 was estimated at approximately 13,200 fall chum salmon; the lowest estimated for this river since 1982 and the second lowest on record since 1974. By comparison, the Delta River escapement estimate of approximately 32,900 spawners was the highest ever estimated for this river. Although no escapement objectives exist for other fall chum salmon spawning areas in the upper Tanana River, good escapement levels were realized based upon observations to prominent spawning areas in the Big Delta region (e.g., Bluff Cabin and Clearwater Lake Outlet Sloughs).

The preliminary population estimate of fall chum salmon entering the Canadian portion of the upper Yukon River made by DFO was 112,850 fish. Subtracting the preliminary estimated Canadian commercial and non-commercial harvest (36,403, excluding Old Crow) from this population estimate results in a total escapement estimate to Yukon Territory (excluding the Porcupine River drainage) of approximately 76,400 spawners. This estimate approached the minimum escapement objective of 80,000 fish. An aerial estimate of spawners in the Kluane River was approximately 11,700, while only 2,426 were estimated in the mainstem Yukon River spawning between Fort Selkirk and Tatchun Creek.

Summation of 1991 preliminary fall chum salmon inriver commercial and subsistence harvest (463,651), together with an estimated total spawning escapement of

348,204 fish (twice the observed 4-area escapement index), reveals total run size to have been on the order of magnitude of 812,000 fish. The 1991 fall chum salmon pre-season projection was 855,000.

A previously undocumented fall chum salmon spawning area was identified in the upper portion of the Kantishna River on October 15. Two spawning fish were observed with the lower 10 miles of Hult Creek, a tributary of Birch Creek. The survey was given an overall rating of "poor" primarily due to shadows from timber along stream banks and dark stream bottom coloration. Otherwise, water was clear and the area appeared to be springfed. This area was subsequently nominated for inclusion in the State's *Catalog of Waters Important for Spawning, Rearing, and Migration of Anadromous Fish*.

Coho Salmon

Coho salmon escapement assessment is very limited in the Yukon River drainage due to funding limitations and survey conditions at that time of year. Most information on spawning escapements that has been collected is from the Tanana River drainage although coho salmon passage at Pilot Station in the mainstem Yukon River has been partially monitored since 1986.

In 1991, comparative cpue data from lower Yukon River test fisheries indicated an above average return and average timing of coho salmon. However, coho salmon passage at Pilot Station (approximately 70,700 through September 1) and later Tanana River test fishing cpue data indicated more of an average to below average return.

Coho salmon spawning escapements were only examined in the Tanana River drainage in 1991 (Table 7). Relative magnitude of escapements throughout the drainage exhibited a similar pattern to that of fall chum salmon; i.e., good in the upper portion of the Tanana River drainage, as evidenced by observations made in the Big Delta region, and comparatively much weaker in the lower portion of the Tanana River drainage. For example, a record number of spawners (23,900) was documented in the Delta Clearwater River, and 3,150 were observed in the outlet stream of Clearwater Lake, the third largest number on record since 1972.

By comparison, coho salmon escapements in Nenana River index areas were 564 for Lost Slough and only 52 for Seventeen Mile Slough. An additional 447 were observed in the Nenana River immediately upstream of the Teklanika River. Observations on coho salmon escapement for the Toklat River (Kantishna River drainage) included 467 in upper Barton Creek, 427 in Geiger Creek, 30 in Sushana River, and 78 in the mainstem Toklat River at Knights Roadhouse. An additional 33 coho salmon were observed in Moose Creek of the Bearpaw River drainage.

Two previously undocumented coho salmon spawning areas were identified in the upper Kantishna River on October 15. Seven adult spawners were observed in the lower 10 miles of Hult Creek (tributary to Birch Creek), and four adult spawners were observed within the lower 5 miles of White Creek (tributary of Foraker River). The survey of each of these areas were given an overall rating of "poor" primarily as a result of shadows from tall timber along stream banks. These two

areas of spawning, although in different streams, lie within close proximity (1-2 miles). Subsequent surveys revealed both areas as being springfed and likely sharing a common underground aquifer. These areas were subsequently nominated for inclusion in the State's *Catalog of Waters Important for Spawning, Rearing, and Migration of Anadromous Fish*.

SONAR SITE SURVEYS

The U.S. Fish and Wildlife Service (FWS) received funding for main river sonar project development in the Yukon River drainage in 1991. A subcommittee of the Joint Technical Committee (JTC), responsible for sonar project planning, developed an initial planning document in the spring of 1991. That document specified, in addition to acquisition of new equipment, site surveys would be conducted in 1991 on the mainstem Yukon and Porcupine Rivers near the U.S./Canadian border. To that end, results of the site survey work are briefly presented here.

The Yukon River sonar site survey was conducted cooperatively by Alaska Department of Fish and Game (ADF&G), FWS, and DFO staff in early August. Potential sites from 8 miles below Eagle, Alaska, to the DFO salmon tagging site in Canada were surveyed. The Porcupine River site survey was conducted cooperatively by ADF&G and FWS during mid-August and included examining potential sites in a 5 mile stretch immediately upstream of the Coleen River in Alaska, and a 10 mile stretch immediately below the U.S./Canadian border.

In November 1991, based upon survey team recommendations, the JTC agreed to selection of a Yukon River sonar site approximately 1 mile downstream from Eagle, Alaska, and to proceed with implementation of "Year 2" field work as funding permits. The JTC also agreed that further study of salmon stock distribution in the Porcupine River drainage would be beneficial prior to a decision on sonar project development on that river.

1. Yukon River 1991 fishing season interim escapement objectives for selected salmon species and index streams. a

Stream	Species	Interim Escapement Objectives	Species	Interim Escapement Objectives	Species	Interim Escapement Objectives b
Andreafsky River						
East Fork	Chinook	1,600 c,r	Summer Chum	109,000 d,r	--	
West Fork	Chinook	1,000 c,r	Summer Chum	116,000 d,r	--	
Anvik River						
Mainstem						
Yellow River to McDonald Cr	Chinook	500 c,r	--		--	
Goblet Cr to McDonald Cr	--		Summer Chum	356,000 d,r	--	
Sonar b	--		Summer Chum	487,000 b,e		
Mulato River						
North Fork	Chinook	500 c	Summer Chum	53,000 d,r	--	
South Fork	Chinook	500 c	--		--	
Hogatza River						
Clear Creek	--		Summer Chum	8,000 d,r	--	
Caribou Creek	--		Summer Chum	9,000 d,r	--	
Gisasa River	Chinook	650 c	--		--	
Chena River						
Mainstem from Flood Control Dam to Middle Fork	Chinook	1,700 c,r	--		--	
Salcha River	Chinook	2,500 j	Summer Chum	3,500 c	--	
Sheenjek River	--		--		Fall Chum	>64,000 f
Fishing Branch River (YT) d	--		--		Fall Chum	50,000-120,000 g
River	--		--		Fall Chum	>33,000 f
River	--		--		Fall Chum	>11,000 f
Upper Yukon River (Border E.O.)	Chinook	33,000-43,000 b,h	--		Fall Chum	>80,000 i

a Index streams have been designated due to their importance as spawning areas and/or by their geographic location with respect to other unsurveyable salmon spawning streams in the general area. Interim escapement objectives represent the approximate number of desired spawners considered necessary to maintain the reproductive potential of each stock and are based upon historical performance, i.e., they are predicated upon some measure of historic averages. Unless otherwise indicated, escapement objectives are based upon aerial survey index estimates which do not represent total escapement but do reflect annual spawner abundance when using standard survey methods under acceptable survey conditions.

b Interim escapement objectives of total spawning abundance based upon sonar, weir, mark-and-recapture, or expansions from inseason point estimates.

c Interim escapement objectives developed by ADF&G in 1983; (r) indicates objectives were originally established in the form of a range. They first appear as a single objective in April 1987 (Table 1) and November 1988 (Table 8, footnote a) JTC reports.

d Interim escapement objectives developed by ADF&G in 1983; (r) indicates objectives were originally established in the form of a range. They first appear as a single objective in November 1988 JTC report (Table 9, footnote a).

e Optimum escapement objective calculated from escapement-return relationships.

f Interim escapement objectives developed by ADF&G for November 1990 JTC.

g Interim escapement objective developed by JTC in October 1987. (Page 42 October 6-8, 1987 JTC report).

h Interim spawning escapement objective developed by JTC in March 1987. (Page 6 and Table 1 of April 1987 JTC report).

i Interim escapement objective established by JTC in November 1990.

j Interim escapement objective established by ADF&G in March 1990; original objectives were developed in 1983 in the form of a range (1,500-3,500).

Table 2. Salmon spawning escapement estimates for the Yukon River drainage, 1991. a

Stream (drainage)	Date	Survey Rating	Chinook	Summer Chums	Fall Chums	Coho
Andreafsky River						
East Fork	7/22	Fair	1,938	31,886	--	--
West Fork	7/22	Fair	2,544	46,657	--	--
Subtotal			4,482	78,543	--	--
Yukon River (Pilot Station)						
Main River Sonar b,c	6/5-9/1		(75,681)	(1,232,874)	(596,922)	(70,725)
Anvik River						
Aerial Counts						
Mainstem River	7/23	Poor	808	--	--	--
Yellow Ri-McDonald Cr	7/23	Poor	(625)	--	--	--
Beaver Creek	7/23	Poor	38	--	--	--
Otter Creek	7/23	Poor	22	--	--	--
Swift River	7/23	Poor	1	--	--	--
McDonald Creek	7/23	Poor	6	--	--	--
Sonar Count c,d	6/19-7/26		--	847,772	--	--
Subtotal			875	847,772	--	--
Grayling Creek f	7/17	Poor	0	1,037	--	--
Blackburn Creek f	7/18	Good	0	2,165	--	--
Rodo River	7/19	Poor	179	3,977	--	--
Kaltag River	7/19	Incomplete	(14)	(1,232)	--	--
Weir (4-K & Youth Development)	7/11-8/6	Partial Cts	21 c	5,130 c	--	--
Subtotal			21	5,130	--	--
Mulato River						
South Fork	7/22	Good	1,253	13,150	--	--
North Fork (from confl w/ Yukon)	7/22,23	Good	767	12,491	--	--
Subtotal			2,020	25,641	--	--
Koyukuk River Drainage						
Gisasa River	7/23	Good	1,690	7,003	--	--
Kateel River	7/23	Incomplete	65	800	--	--
Dakli River	7/24	Good	0	6,602	--	--
Wheeler Creek	7/24	Good	0	7,801	--	--
Subtotal			0	14,403	--	--
Hogatza River						
Clear Creek	7/24	Fair	--	4,293	--	--
Caribou Creek (aerial)	7/24	Fair	--	5,654	--	--
Ground Survey upper portion	7/23	Good	--	(796)	--	--
Subtotal			--	9,947	--	--
Alatna River	10/20	Recon Survey	--	--	0	0
Henshaw Creek	7/24	Good	455	2,148	--	--
South Fork Koyukuk River	7/25	Good	466	121	--	--
Jim River	7/25	Poor	164	187	--	--
Subtotal			630	308	--	--
John River	10/20	Recon Survey	--	--	0	0
Middle Fork Koyukuk River	7/25	Good	60	0	--	--
Total Koyukuk River			2,900	34,609	0	0

-continued-

Table 2. (page 2 of 4)

Hot Springs Creek	7/26,10/20	Fair, Recon	9	1,720	0	0
Lois Creek	10/20	Recon Survey	--	--	0	0
Grant Creek	10/20	Recon Survey	--	--	0	0
Tozitna River	7/18	Fair	119	93	--	--
Total Lower Yukon River			10,605	1,000,687	0	0
Lower Tanana River Drainage						
Kantishna River Drainage						
Toklat River						
Barton Creek	10/21	Incomplete	--	--	0	467
Floodplain v/c Rdhse u	10/17-20	Fair-Good	--	--	6,863	78
Gelger Creek f	10/18	Fair-Good	--	--	2,165	427
Sushana River u	10/19,21	Fair	--	--	1,226	30
Population Estimate g			--	--	(13,197)	--
Subtotal			--	--	10,254	1,002
Clear Creek	7/26	Incomplete	75	--	--	--
Bearpaw River	7/26,10/15	Fair, Fair	130	--	0	0
Moose Creek	7/26,10/15	Incomp, Fair	9	--	0	33
Subtotal			139	--	0	33
Birch Creek	10/15	Fair	--	--	0	0
Hult Creek	10/15	Poor	--	--	2	7
Subtotal			--	--	2	7
Foraker River						
White Creek	10/15	Poor	--	--	0	4
Tanana River Drainage						
Mainstem Nenana (upstr Teklanika)	10/15	Fair	--	--	0	447
Teklanika River eastern spring adjacent to Comma Lake	10/15	Fair	--	--	--	106
Seventeen Mile Slough	7/26,10/15	Fair, Fair	173	84	400	52
Lost Slough	10/15	Fair	--	--	0	564
Subtotal			173	84	400	1,169
Chatanika River	7/21,8/11	Poor, Fair	104	99 i	--	--
Chena River						
Mainstem River (aerial)	7/22,8/3	Poor, Incomp	1,277	115	--	--
MCD to Middle Fk (index area) w	7/27	Poor	(1,277) w	--	--	--
Population Estimate h,i			(3,025) c	--	--	--
Subtotal			1,277	115	--	--
Salcha River						
Mainstem River (aerial)	7/20-21,7/31	Poor, Incomp	2,212	154	--	--
TAPS to Caribou Cr (index area)	7/20	Poor	(1,925)	--	--	--
Population Estimate h,i			(5,608) c	--	--	--
Subtotal			2,212	154	--	--
Total Lower Tanana River			3,980	452	10,656	2,215
Upper Tanana River Drainage						
Open water area across Chisholm Lk	11/1	Poor	--	--	--	10
Open water vic of Little Delta R mo	11/1	Fair	--	--	21	--
Mainstem Tanana sloughs between Shaw Creek and Timber	11/1	Fair	--	--	5,333	--
Slough at Whitestone (below Delta R)	11/1	Fair	--	--	280	--
Delta River						
Foot Survey (peak count)	10/30,11/7	Good	--	--	26,559	38
Whitestone Cr	11/7	Good	--	--	--	0
Population Estimate g			--	--	(32,905)	--

-continued-

Table 2. (page 3 of 4)

Goodpastor River	7/21	Poor	868	--	--	--
Luff Cabin Slough f	10/22	Good	--	--	7,198	--
Clearwater Lake Outlet Slough f	10/29	Good	--	--	4,291	29
Clearwater Lake and Outlet i,j	10/23	Good	--	--	300	3,150
Delta Clearwater River i,j	10/23	Good	--	--	800	23,900
Pearse Slough	11/1	Fair	--	--	378	--
Total Upper Tanana River			868	--	45,160	27,127
Total Tanana River			4,848	452	55,816	29,342
Minook Creek	7/18	Good	0	18	--	--
Beaver Creek (boat) j,x	7/18-28		80	--	--	--
Beaver Creek (boat) j,x	7/22-31		(47)	--	--	--
Porcupine River Drainage						
Sheenjek River (Aerial)	9/4	Good (early)	--	--	(13,151)	--
Sonar Estimate d	8/9-9/24		--	--	90,000 c	--
Fishing Branch River (Aerial) k	10/8	Good	--	--	(10,284) k	--
Weir Passage k	9/1-10/15		--	--	37,733 k	--
Total Porcupine River			--	--	127,733	--
Total Alaskan Portion of Drainage			15,533	1,001,157	145,816 m	29,342
Yukon Territory Streams						
White River						
Donjek River						
Kluane River k	10/15	Good	--	--	11,675	--
Koidern River k	10/15	Fair	--	--	53	--
Subtotal			--	--	11,728	--
Pelly River Drainage						
Ross River k	8/21	Fair	250	--	--	--
Little Salmon River k	8/19	Fair	326	--	--	--
Big Salmon River k						
Big Salmon Lake to Souch Cr	8/19	Good	1,040	--	--	--
Teslin River Drainage						
Mainstem Teslin River k	10/28	Fair	--	--	468	--
Nisutlin River k	8/19	Aborted	--	--	--	--
Wolf River k	8/19	Fair	201	--	--	--
Subtotal			201	--	468	--
Whitehorse Fishway Counts k	7/25-8/777?		1,266 n	--	--	--
Mainstem Yukon River						
Tatchun Creek to Ft Selkirk k	10/17	Fair	--	--	2,426	--
Border Passage Estimate h,k			(40,993)c,	--	(112,850)c,	--
Subtotal			--	--	2,426	--
Total Yukon Territory (observed)			3,083	--	52,355 m	--
Total Yukon Territory (estimated) q			(22,582) q	--	(76,447) q	--
Yukon River Drainage Totals			18,616	1,001,157	198,171	29,342

a Estimates are from aerial surveys (peak count) unless otherwise indicated; carcass counts included. Data in parentheses not included in totals or subtotals.

b Biosonics sonar estimate.

c Preliminary.

d Bendix side scan sonar estimate.

e U.S. Fish and Wildlife Service estimate.

f Foot survey.

g Population estimate based upon replicate foot surveys and streamlife data.

Population estimate based upon mark and recapture study

Sport Fish Division estimate.

-continued-

Table 2. (page 4 of 4)

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- that survey.
 - Canadian Department of Fisheries and Oceans (DFO) estimate.
 - al for Alaskan portion of drainage does not include Fishing Branch River. Total for Yukon Territory includes Fishing Branch River.
 - n Only 1,071 of the chinook salmon which returned to the fishway were passed; 82 females (average fecundity 5,240) and 86 males were taken for hatchery brood stock; an additional 27 chinook salmon died at the fishway. The number of clipped chinook salmon which returned to the fishway totaled 506.
 - p Canadian estimates for Yukon Territory streams excluding the Fishing Branch River. Commercial and subsistence catches have not been removed from these estimates. These are "border" escapement estimates.
 - q Estimated spawning escapement from DFO tagging study (border passage estimate minus harvest).
 - u Combination foot and aerial survey.
 - w May include a few chinook in the Middle Fork River, downstream of Munson Creek.
 - x U.S. Bureau of Land Management (BLM) estimates.

Table 3. Chinook salmon escapement counts for selected U.S. spawning stocks in the Yukon River drainage, 1961-1991.^a

Year	Andreafsky River		Anvik River ^b		Mulato River	Gisasa River	Chena River		Salcha River	
	East Fork	West Fork	Aerial	Tower			River	Index ^g	River	Index ^h
1961	1,003	-	1,226	-	543 c	266 c	-	-	2,878	-
1962	675 c	762 c	-	-	-	-	61 c,d	-	937	-
1963	-	-	-	-	-	-	137 c	-	-	-
1964	867	705	-	-	-	-	-	-	450	-
1965	-	344 c	650 c	-	-	-	-	-	408	-
1966	361	303	638	-	-	-	-	-	800	-
1967	-	276 c	336 c	-	-	-	-	-	-	-
1968	380	383	310 c	-	-	-	-	-	739	-
1969	274 c	231 c	296 c	-	-	-	-	-	461 c	-
1970	665	574 c	368	-	-	-	6 c	-	1,882	-
1971	1,904	1,682	-	-	-	-	193 c,d	-	158 c	-
1972	798	582 c	-	1,198	-	-	138 c,d	-	1,193	1,034
1973	825	788	-	613	-	-	21 c	-	391	-
1974	-	285	-	471 c	78 c	161	1,016 d	959 d	1,857	1,620
1975	993	301	-	730	204	385	316 d	262 d	1,055	-
1976	818	643	-	1,153	648	332	531	496	1,641	1,473
1977	2,008	1,499	-	1,371	487 c	255	563	-	1,202	1,052
1978	2,487	1,062	-	1,324	920	45 c	1,726	-	3,499	3,258
1979	1,180	1,134	-	1,484	1,507	484	1,159 c	-	4,789	-
1980	958 c	1,500	1,192	-	1,323 c	951	2,541	-	6,757	6,126
1981	2,146 c	231 c	577 c	-	791 c	-	600 c	-	1,237	1,121
1982	1,274	851	-	-	-	421	2,073	-	2,534	2,346
1983	-	-	376 c	-	1,006	572	2,553	2,336	1,961	1,803
1984	1,573 c	1,993	574 c	-	-	-	501	494	1,031	906
1985	1,617	2,248	720	-	2,780	735	2,553	2,262	2,035	1,860
1986	1,954	3,158	918	-	2,974	1,346	2,031	1,935	3,368	-
1987	1,608	3,281	879	-	1,638	731	1,312	1,209	1,898	1,671
1988	1,020	1,448	1,449	-	1,775	797	1,966	1,760	2,761	2,553
1989	1,399	1,089	212 c	-	-	-	1,280	1,185	2,333	2,136
1990	2,503	1,545	1,595	-	998	884 c	1,436	1,402	3,744	3,429
1991	1,938	2,544	625 c	-	2,020	1,690	1,277 c	1,277 c,i	2,212 c	1,925 c
E.O.e	1,600	1,000	500 f	-	1,000	650		1,700		2,500

a Data obtained by aerial survey unless otherwise noted. Only peak counts are listed.

b From 1961-1970, aerial survey count data are from various segments of the mainstem Anvik River.

From 1971-1979, mainstem aerial survey counts below the tower were added to tower counts.

From 1980-present, aerial survey counts are for mainstem Anvik River between Yellow River and McDonald Creek.

c Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.

d Boat Survey.

e Interim escapement objective.

f Interim escapement objective for the mainstem Anvik River between the Yellow River and McDonald Creek.

g Chena River index area for assessing escapement objectives is from Moose Creek Dam to Middle Fork River.

h Salcha River index area for assessing escapement objectives is from TAPS crossing to Caribou Creek.

i May include a few fish in Middle Fork River, below Munson Creek.

Table 4. Chinook salmon escapement counts for selected Canadian spawning stocks in the Yukon River drainage, 1961-1991.^a

Year	Tincup Creek	Tatchun River b	Little Salmon River	Big Salmon River d	Misutlin River e	Wolf River f	Whitehorse Fishway g	Mainstem Tagging Estimate h
1961	-	-	-	-	-	-	1,068	-
1962	-	-	-	-	-	-	1,500	-
1963	-	-	-	-	-	-	483	-
1964	-	-	-	-	-	-	595	-
1965	-	-	-	-	-	-	903	-
1966	-	7 c	-	-	-	-	563	-
1967	-	-	-	-	-	-	533	-
1968	-	-	173 c	857 c	407 c	-	414	-
1969	-	-	120	286	105	-	334	-
1970	-	100	-	670	615	71 c	625	-
1971	-	130	275	275	650	750	856	-
1972	-	80	126	415	237	13	391	-
1973	100	99	27 c	75 c	36 c	-	224	-
1974	-	192	-	70 c	48 c	-	273	-
1975	-	175	-	153 c	249	40 c	313	-
1976	-	52	-	86 c	102	-	121	-
1977	-	150	408	316 c	77	-	252	-
1978	-	200	330	524	375	-	725	-
1979	-	150	489 c	632	713	183 c	1,184	-
1980	-	222	286 c	1,436	975	377	1,383	-
1981	-	133	670	2,411	1,626	395	1,555	-
1982	-	73	403	758	578	104	473	19,790
1983	100	264	101 c	540	701	95	905	28,989
1984	150	153	434	1,044	832	124	1,042	27,616 i
1985	210	190	255	801	409	110	508	10,730
1986	228	155	54 c	745	459 c	109	557	16,415
1987	100	159	468	891	183	35	327	13,210
1988	204	152	368	765	267	66	405	23,118
1989	88	100	862	1,662	695	146	549	25,201
1990	83	643	665	1,806	652	188	1,407	37,707
1991	-	-	326	1,040	-	201 j	1,266	22,582 k

E.O. m

33,000-43,000

- a Data obtained by aerial survey unless otherwise noted. Only peak counts are listed.
b All foot surveys except 1978 (boat survey) and 1986 (aerial survey).
c Incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.
d For 1968, 1970, and 1971 counts are from mainstem Big Salmon River. For all other year counts are from the mainstem Big Salmon River between Big Salmon Lake and vicinity of Souch Creek.
e One Hundred Mile Creek to Sidney Creek.
f Wolf Lake to Red River.
g Includes 50,90, and 292 fin-clipped hatchery-origin salmon in 1988, 1989, and 1990, respectively.
h Estimated total spawning escapement excluding Porcupine River (estimated border escapement minus the Canadian catch).
i Estimate derived by dividing the 1984 5-area (Whitehorse Fishway, Big Salmon, Misutlin, Wolf, Tatchun) by the average proportion of the 5-area index count to the estimated spawning escapements from the DFO tagging study for years 1982, 1983, and 1985-1989.
j Wolf Lake to Fish Lake outlet.
k Preliminary
m Interim escapement objective.

Table 5. Summer chum salmon escapement counts for selected spawning areas in the Yukon River drainage, 1973-1991. a

Year	Andreafsky River		West Fork	Anvik River		Nulato River	Gisasa River	Hogatza River	Chena River	Salcha River
	East Fork			Tower & Aerial						
	Aerial	Sonar or Tower		Aerial	Sonar					
1973	10,149 b	-	51,835	86,665 b	-	-	-	-	-	-
1974	3,215 b	-	33,578	201,277	-	51,160	-	-	-	3,510
1975	223,485	-	235,954	845,485	-	138,495	-	22,355	-	7,573
1976	105,347	-	118,420	406,166	-	40,001 b	-	20,744	-	6,474
1977	112,722	-	63,120	262,854	-	69,660	-	10,734	-	677 b
1978	127,050	-	57,321	251,339	-	54,480	9,280 b	5,102	1,609	5,405
1979	66,471	-	43,391	-	280,537	37,104	10,962	14,221	1,025 b	3,060
1980	36,823 b	-	115,457	-	492,676	14,946 b	10,388	19,786	338	4,140
1981	81,555	147,312 c	-	-	1,479,582	14,348 b,d	-	-	3,500	8,500
1982	7,501 b	181,352 c	7,267 b	-	444,581	-	334 b	4,984 b	1,509	3,756
1983	-	110,608 c	-	-	362,912	21,012 b	2,356 b	28,141	1,097	716 b
1984	95,200 b	70,125 c	238,565	-	891,028	-	-	-	1,861	9,810
1985	66,146	-	52,750	-	1,080,243	29,838	13,232	22,566	1,005	3,178
1986	83,931	167,614 e	99,373	-	1,189,602	64,265	12,114	-	1,509	8,028
1987	6,687 b	45,221 e	35,535	-	455,876	11,257	2,123	5,669 b	333	3,657
1988	43,056	68,937 e	45,432	-	1,125,449	42,083	9,284	6,890	432	2,889 b
1989	21,460 b	-	-	-	636,906	-	-	-	714 b	1,574 b
1990	11,519 b	-	20,426 b	-	403,627	4,615 b	450 b	2,177 b	100 b	450 b
1991	31,886	-	46,657	-	847,772	25,641	7,003	9,947	115 b	154 b
E.O.f	109,000	-	116,000	-	487,000	-	-	17,000 g	-	3,500

a Data obtained by aerial survey unless otherwise noted. Only peak counts are listed.

b Incomplete survey and/or poor survey timing or conditions resulted in minimal or inaccurate count.

c Sonar count.

d Includes only the South Fork Nulato River.

e Tower count.

f Interim escapement objective.

g Interim escapement objective includes Clear Creek (8,000) and Caribou Creek (9,000).

Table 6. Fall chum salmon escapement counts for selected spawning areas in the Yukon River drainage, 1974-1991.

Year	Delta River a	Toklat River b	Chandalar River c	Sheenjek River d	Fishing Branch River e	Canada Mainstem Tagging Estimate f
1974	5,915	43,484	-	89,966	32,525 g	-
1975	3,734 h	90,984	-	173,371	353,282 g	-
1976	6,312 h	53,882	-	26,354	36,584	-
1977	16,876 h	36,462	-	45,544	88,400	-
1978	11,136	37,057	-	32,449	40,800	-
1979	8,355	179,627	-	91,372	119,898	-
1980	5,137	26,373	-	28,933	55,268	-
1981	23,508	15,775	-	74,560 c	57,386 i	-
1982	4,235	3,601	-	31,421 c	15,901	31,958
1983	7,705	20,807	-	49,392 c	27,200	90,875
1984	12,411	16,511	-	27,130 c	15,150	56,633 j
1985	17,276 h	22,805	-	152,768 c	56,016 g	62,010
1986	6,703 h	18,903	59,313	83,197 c	31,723 g	87,990
1987	21,180	22,141	52,416	140,086 c	48,956 g	80,776
1988	18,024	13,324	33,619	41,073 c	23,597 g	36,786
1989	21,342 h	30,447	69,161	101,748 c,k	43,834 g	35,750
1990	8,992 h	33,672	78,631	65,721 c,*	35,000 m	51,755
1991	32,905 h	13,197	-	90,000 c,*	37,733 g	76,447
E.O.n	>11,000	>33,000	-	>64,000	50,000 -120,000	>80,000

a Total escapement estimates made from migratory time density curve (see Barton 1986), unless otherwise indicated.

b Total escapement estimates using Delta River migratory time density curve and percentage of live salmon present by survey date in the upper Toklat River area.

c Sonar estimate.

d Total escapement estimates using sonar to aerial survey expansion factor of 2.221, unless otherwise indicated.

e Total escapement estimates using weir to aerial survey expansion factor of 2.72, unless otherwise indicated.

f Estimated total spawning estimates excluding Porcupine-Fishing Branch Rivers (estimated border escapement minus Canadian removal).

g Weir estimate.

h Population estimate from replicate foot surveys and stream life data.

i Initial aerial survey count was doubled before applying the weir/aerial expansion factor of 2.72 since only half of the spawning area was surveyed.

j Escapement estimate based on mark-recapture program unavailable. Estimate based on assumed average exploitation rate.

k Includes an estimated 20,000 fall chum salmon present in river prior to sonar operations. Sonar count was 81,748 chum salmon.

m Weir was not operated. Although only 7,541 chum salmon were counted on a single survey flown October 26, a population estimate of approximately 27,000 fish was made through date of survey, based upon historic average aerial-to-weir expansion of 28%. Actual population of spawners was reported by DFO as between 30,000-40,000 in view of aerial survey timing.

n Interim escapement objective.

* Preliminary data.

Table 7. Coho salmon escapement counts for selected spawning areas in the Yukon River drainage, 1972-1991.^a

Year	Kantishna River		Nenana River				Delta Clearwater River d,e	Clearwater Lake and Outlet	Richardson Clearwater River
	Geiger Creek	Barton Creek	Lost Slough	Nenana Mainstem b	Wood Creek c	17 Mile Slough			
1972	-	-	-	-	-	-	632	417	454 f
1973	-	-	-	-	-	-	3,322	551 d	375 d
1974	-	-	1,388	-	-	27	3,954	560	652 d
1975	-	-	943	-	-	956	5,100	1,575 d,e	4 f
1976	25 g	-	118	-	-	281	1,920	1,500 d,e	80 f
1977	60	-	524	-	310 g	1,167	4,793	730 d,e	327
1978	-	-	350	-	300 g	466	4,798	570 d,e	-
1979	-	-	227	-	-	1,987	8,970	1,015 d,e	372
1980	3 g	-	499	-	1,603 g	592	3,946	1,545 d,e	611
1981	-	-	274	-	849 h	1,005	8,563 i	459 f	550
1982	81 g	-	-	-	1,436 h	-	8,365 i	-	-
1983	42 g	-	766	-	1,044 h	103	8,019 i	253	88
1984	20	-	2,677	-	8,805 h	-	11,061	1,368	428
1985	42	-	1,584	-	3,775 h	2,081	5,358	750	-
1986	5 g	496	794	-	1,664 h	218 c,e	10,857	3,577	146 f
1987	1,175 g	-	2,511	-	2,450 h	3,802	22,300	4,225 d,e	-
1988	159 g	437	348	-	2,046 h	-	21,600	825 d,e	-
1989	155 g	12 f	-	-	412 h	824 f	11,000	1,600 d,e	483
1990	211 g	-	688	1,308	-	15 f	8,325	2,375 d,e	-
1991	427 g	467 f	564	447	-	52	23,900	3,150 d,e	-

^a Only peak counts presented. Survey rating is fair to good, unless otherwise noted.^b Mainstem Nenana River between confluences of Lost Slough and Teklanika River.^c Surveyed by F.R.E.D. Division.^d Surveyed by Sport Fish Division.^e Boat survey.^f Poor Survey.^g Foot survey.^h Weir count.ⁱ Population Estimate.



Figure 1. The Yukon River drainage.

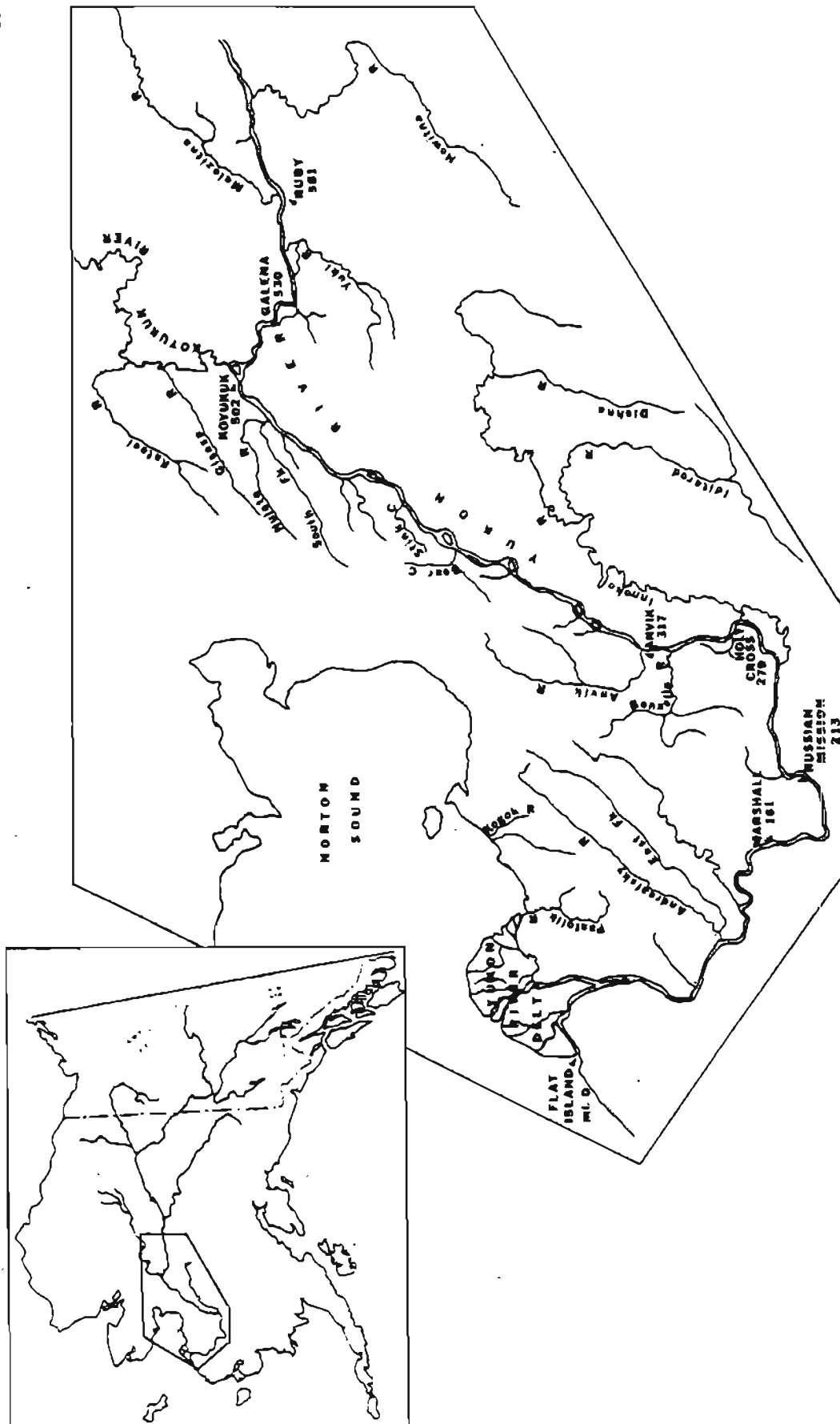


Figure 2. The lower Yukon River drainage.

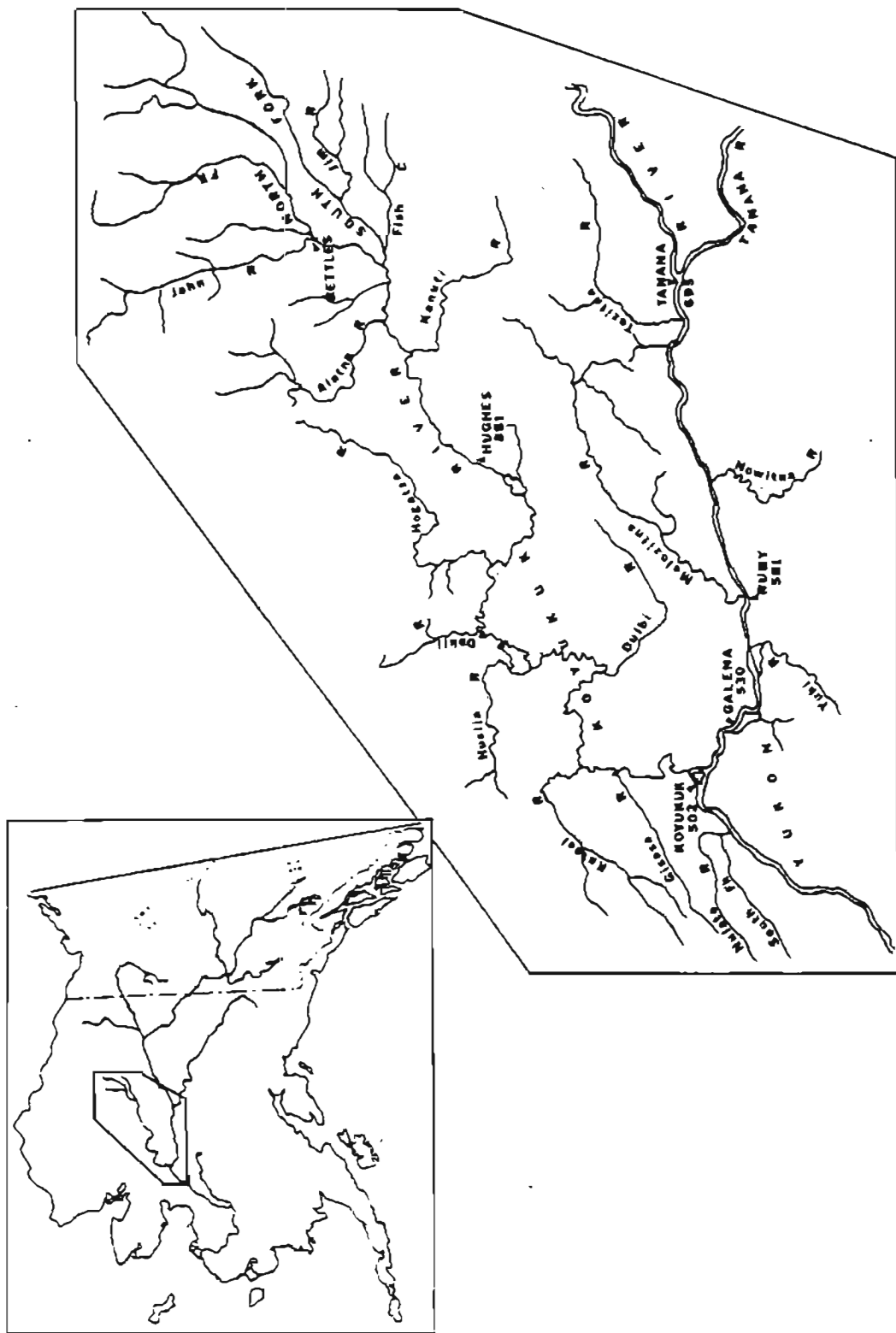


Figure 3. The Koyukuk River drainage.

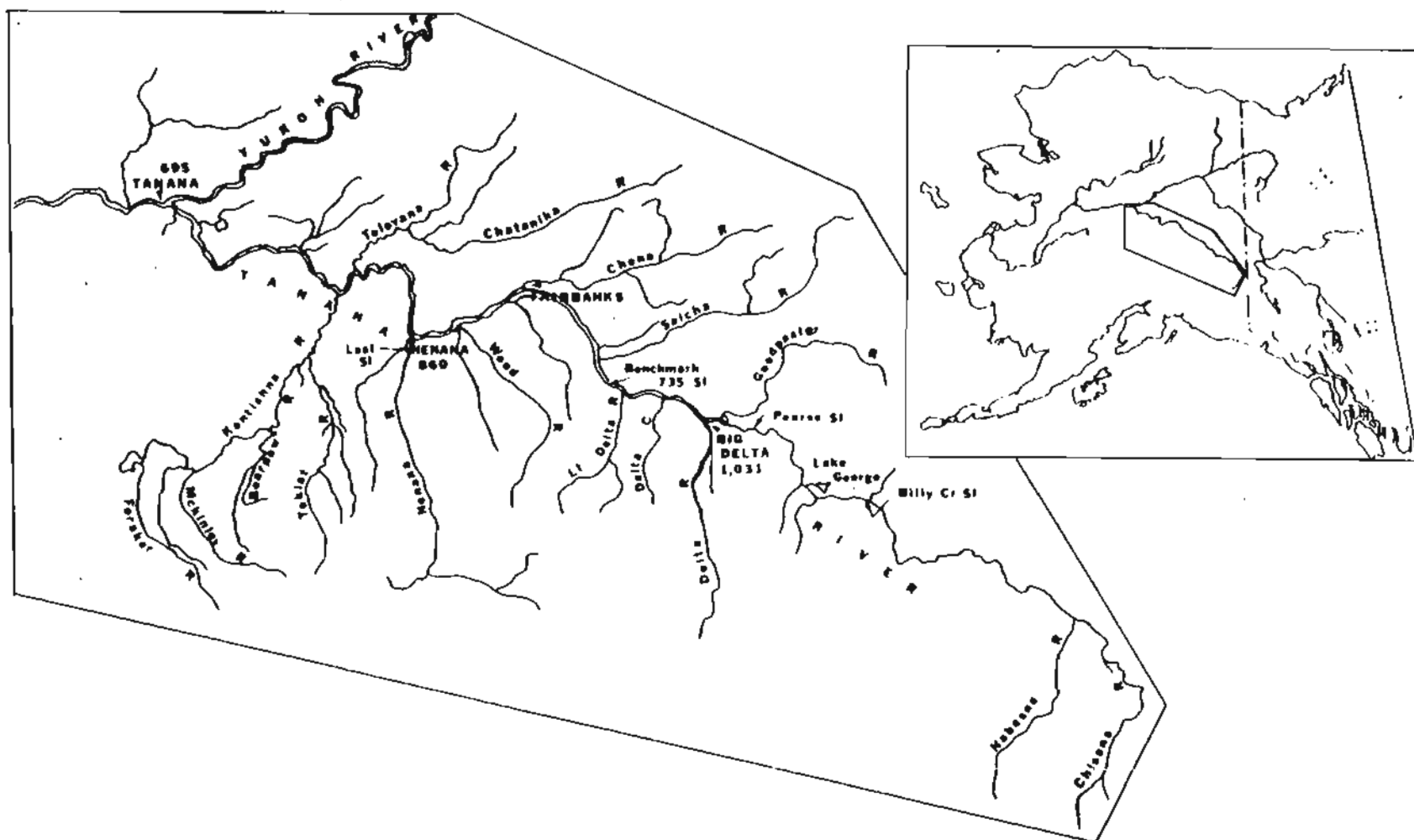


Figure 4. The Tanana River drainage.

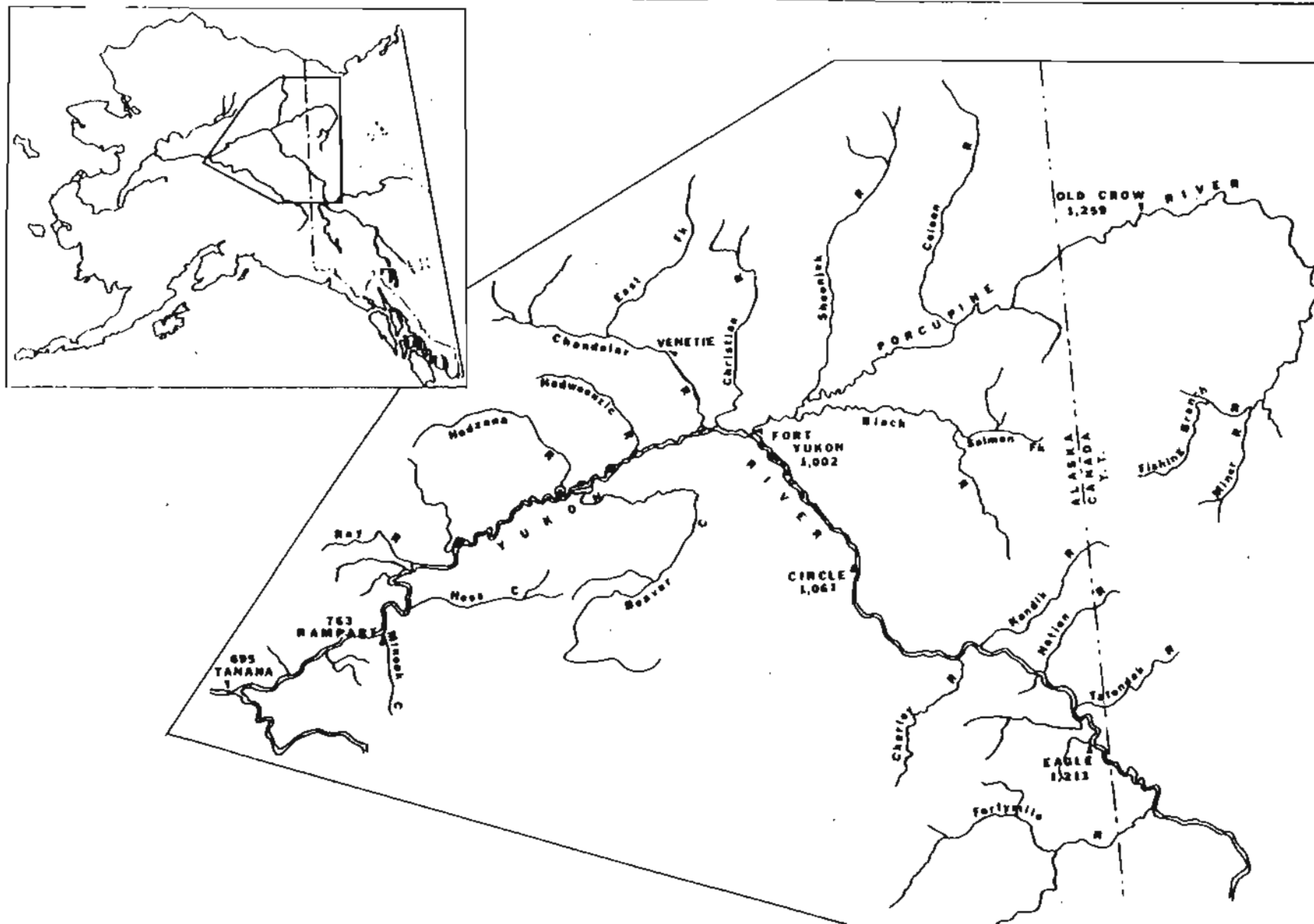


Figure 5. The middle Yukon River and Porcupine River drainage.

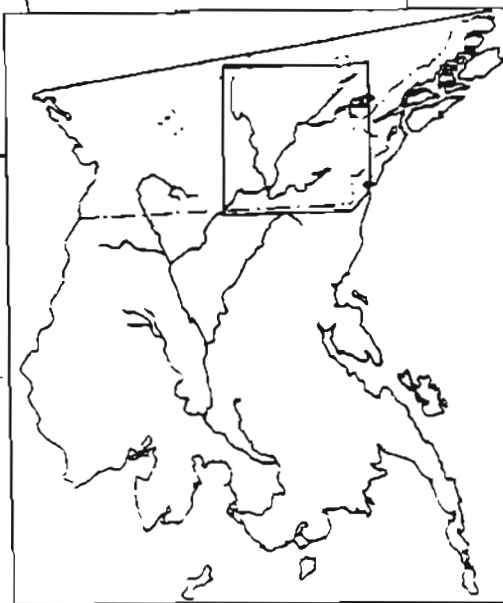
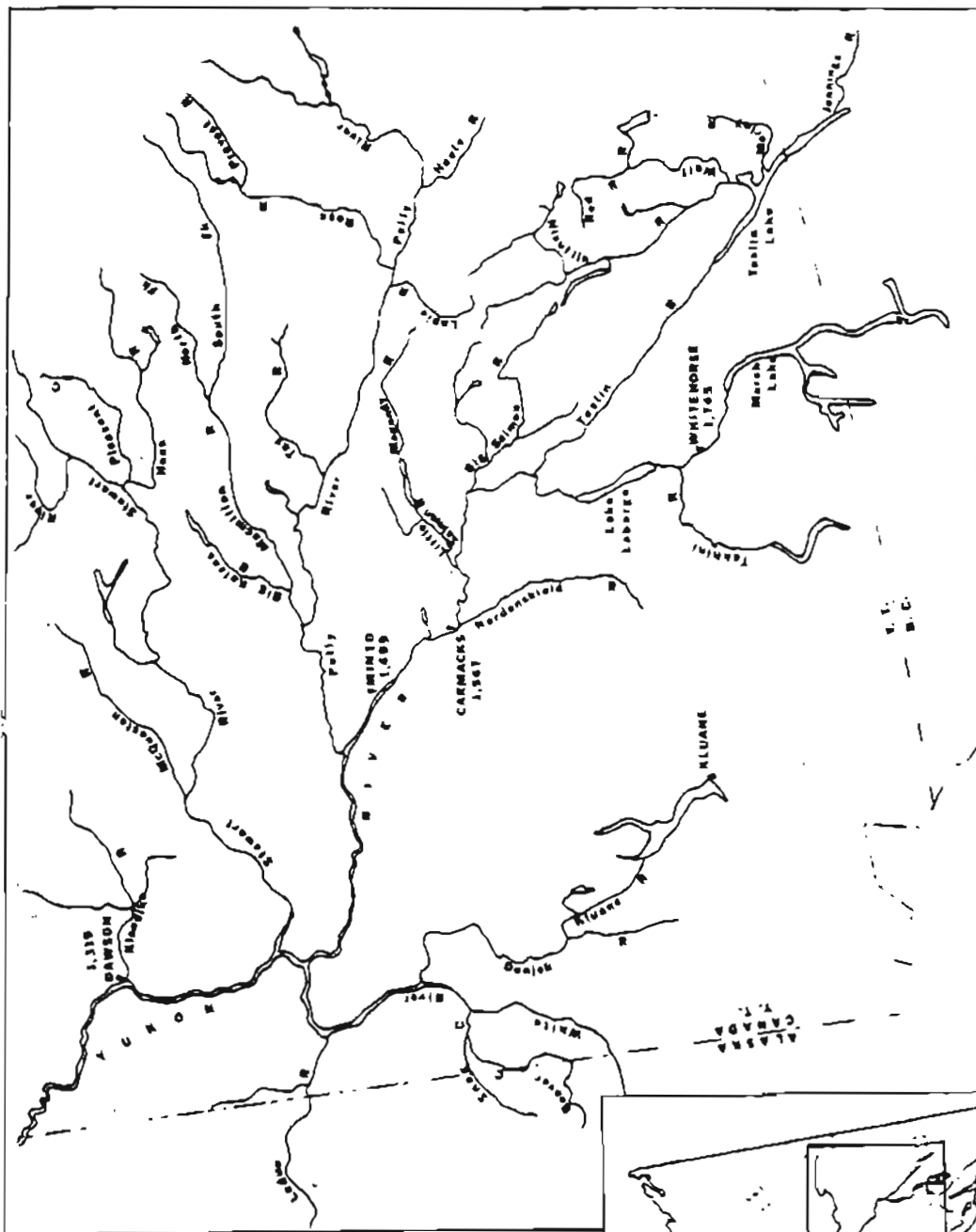


Figure 6. The upper Yukon River drainage.

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